

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



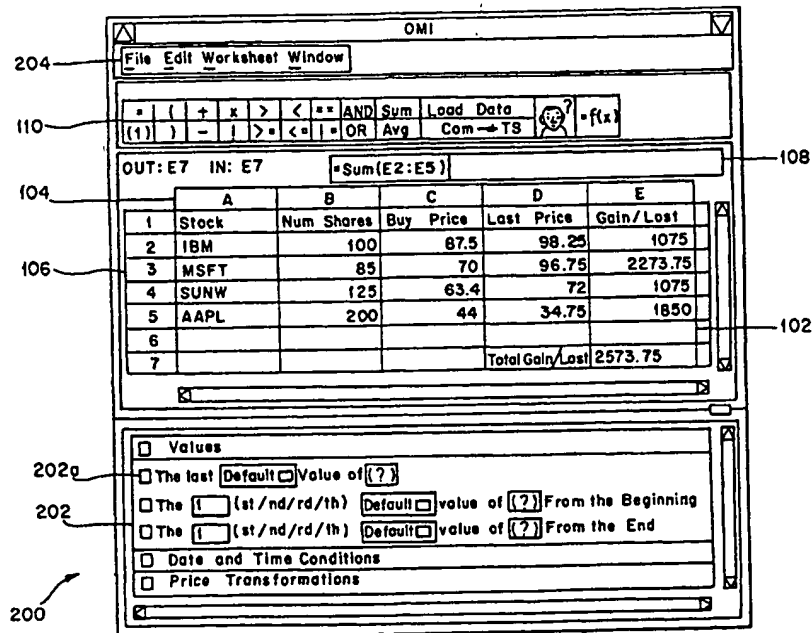
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G06T 11/00, 17/30		A1	(11) International Publication Number: WO 99/66453
			(43) International Publication Date: 23 December 1999 (23.12.99)
(21) International Application Number: PCT/US99/13489			(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 15 June 1999 (15.06.99)			
(30) Priority Data: 09/094,765 15 June 1998 (15.06.98) US			
(71) Applicant: INVENTURE TECHNOLOGIES, INC. [US/US]; 30 Broad Street, New York, NY 10004 (US).			
(72) Inventors: ADLER, Dan; 315 E. 72nd Street #9E, New York, NY 10021 (US). SALAMA, Roberto; 180 West End Avenue #14C, New York, NY 10023 (US).			
(74) Agent: BODNER, Gerald, T.; Hoffmann & Baron, LLP, 6900 Jericho Turnpike, Syosset, NY 11791 (US).			Published With international search report.

(54) Title: COMPUTER-BASED SYSTEM AND METHOD FOR DATA PROCESSING

(57) Abstract

An electronic spreadsheet (200), formed in accordance with the present invention, providing a user with improved data processing capability, including a matrix (102), the matrix including columns (100), rows (106) and cells (102), the cells being formed at intersections of the columns and the rows. The electronic spreadsheet (200) associates objects and formulas with the cells (108), each object having an object type, each formula receiving an object (202) as an argument, each formula having an operator (110), for operating on the object received as the argument. Still further, the electronic spreadsheet (200) evaluates each formula, which includes assigning to the operator in each formula an operative expression (110) selected in accordance with the object type of the object received as the argument of each formula. Still further, the electronic spreadsheet (200) associates a result, obtained during the evaluating procedure, with each cell associated with each formula operating on the object. An additional feature of the invention is that it can be programmed to recognize new data types through user programming or other means. In addition, the invention has been implemented in a client-server computing environment, and in such a way to take advantage of the Java programming environment.



WHAT IS CLAIMED IS:

1. A computer-based data processing system suitable for performing analytical operations on complex data objects, said system being extensible to recognize and operate upon new data object types, said system comprising:

visual presentation display means for displaying a visual presentation to a user,

5 the visual presentation including:

at least one cell matrix including columns, rows and cells, the cells being formed at intersections of the columns and the rows, wherein at least one cell contains a representation of a complex data object comprising reference information to data maintained in a data structure

10 defined in an external computer system, said reference information incorporating characteristics of said externally stored data to enable the data processing system to perform operations on the complex data object; and

at least one text edit field capable of receiving information pertaining to

15 objects and formulas entered by a user through input means;

first associating means for associating objects represented by a cell in the visual presentation and formulas received from a user with said cell;

scanning means for scanning a formula and an object associated with said formula by the first associating means, said scanning means defining permissible

20 operators that may be applied to said object by said formula, said scanning means ensuring that the formula conforms to a preferred cell reference syntax, said scanning means translating each formula not in conformity with such syntax into the preferred cell reference syntax so that the formula can be processed by the system;

evaluating means for evaluating each formula associated with an object,

25 wherein said evaluating means assigns a functional meaning to the operators in each formula in accordance with the object type of the object being operated upon by each formula, wherein at least one such operator is a polymorphic operator capable of

assigning different functional meanings contingent on the type of data object being evaluated, said evaluating means further comprising:

- 30 means for re-evaluating each formula if a value within the at least one object changes; and
- means for re-associating the result of each formula with each cell containing each formula operating on the at least one object whose value has changed;
- second associating means for associating a result produced by said evaluating
- 35 means with each cell associated with each formula operating on the at least one object;
- representation producing means for producing at least one visual representation of at least one result produced by the evaluating means, said at least one visual representation being selectable by the user; and
- instructing means for instructing the system to recognize new objects and new
- 40 operators defined by a user.

2. A computer-based system as defined in Claim 1, wherein the visual presentation further includes:

- a query window, the query window receiving user-provided responses corresponding to English sentence-style pre-defined questions, the query window
- 5 forming a formula in accordance therewith that is entered into the system through the at least one text edit field; and
- a user-selected cell, the first associating means associating the formula formed by the query window with the user-selected cell, the evaluating means evaluating the formula and the second associating means associating a result of the formula with the
- 10 user-selected cell.

3. A computer-based system as defined in Claim 1, wherein each cell has a different visual appearance depending on the object type of each object associated therewith.



US005768158A

United States Patent [19]

Adler et al.

[11] Patent Number: **5,768,158**[45] Date of Patent: **Jun. 16, 1998****[54] COMPUTER-BASED SYSTEM AND METHOD FOR DATA PROCESSING**

[75] Inventors: **Dan Adler; Roberto Salama**, both of New York, N.Y.; **Gerald Zaks**, Mahwah, N.J.

[73] Assignee: **Inventure America Inc.**, New York, N.Y.

[21] Appl. No.: **569,350**

[22] Filed: **Dec. 8, 1995**

[51] Int. Cl.⁶ **G06T 11/00**

[52] U.S. Cl. **364/578; 345/326; 345/333; 707/503; 707/504**

[58] Field of Search **395/764, 765, 395/611, 614; 364/578; 345/333, 121, 326, 339, 340; 707/503, 504, 4**

[56] References Cited**U.S. PATENT DOCUMENTS**

4,750,135	6/1988	Boilen	395/200.61
5,001,654	3/1991	Winiger et al.	707/529
5,033,099	7/1991	Yamada et al.	382/197
5,060,135	10/1991	Levine et al.	345/351
5,208,907	5/1993	Shelton et al.	707/505
5,231,577	7/1993	Koss	707/504
5,255,363	10/1993	Seyler	345/507
5,312,478	5/1994	Reed et al.	707/503
5,317,686	5/1994	Salas et al.	395/157
5,359,724	10/1994	Eadie	707/205
5,371,675	12/1994	Greif et al.	707/503
5,396,587	3/1995	Reed et al.	707/503
5,416,895	5/1995	Anderson et al.	707/503
5,416,900	5/1995	Blanchard et al.	345/346
5,418,902	5/1995	West et al.	707/503
5,428,694	6/1995	Betts et al.	382/317

OTHER PUBLICATIONS

"Using Excel Version 5 for Windows, Special Edition" 1993 Que Corp., Ron Person.

Using Excel Version 5 for Windows, Special Edition R. Person. Que Corp., 1993. (Introduction, New Features, Programming in Vis. Basic, Creating an Application.) (pp. 1-23, pp. 1138-1171, and 1173-1236).

Kurt W. Piersol, "Object Oriented Spreadsheets: The Analytic Spreadsheet Package." *OOPSLA '86 Proceedings*, pp. 385-390 (Sep., 1986).

Marc Levoy, "Spreadsheets for Images." *Computer Graphics Proceedings, Annual Conference Series*, pp. 139-146 (1994) Jan. 1994.

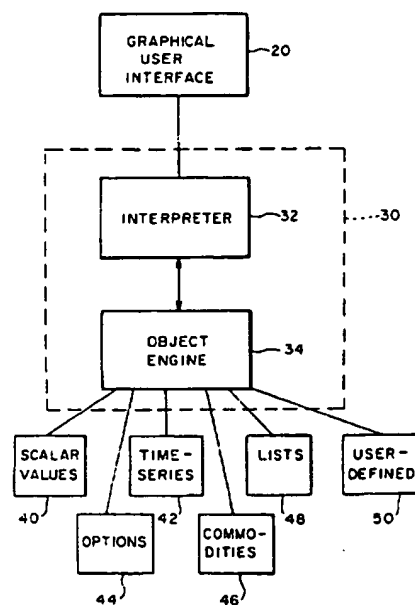
Primary Examiner—Kevin J. Teska

Assistant Examiner—A. S. Roberts

Attorney, Agent, or Firm—Hoffmann & Baron, LLP

[57] ABSTRACT

An electronic spreadsheet, formed in accordance with the present invention, providing a user with improved data processing capability, includes displaying a visual presentation to the user, the visual presentation including a matrix, the matrix including columns, rows and cells, the cells being formed at intersections of the columns and the rows. The electronic spreadsheet associates objects and formulas with the cells, each object having an object type, each formula receiving an object as an argument, each formula having an operator for operating on the object received as the argument. Further, the electronic spreadsheet evaluates each formula, which includes assigning to the operator in each formula an operative expression selected in accordance with the object type of the object received as the argument of each formula. Still further, the electronic spreadsheet associates a result, obtained during the evaluating procedure, with each cell associated with each formula operating on the object.

42 Claims, 9 Drawing Sheets



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06T 11/00, 17/30		A1	(11) International Publication Number: WO 99/66453
			(43) International Publication Date: 23 December 1999 (23.12.99)
(21) International Application Number: PCT/US99/13489		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 15 June 1999 (15.06.99)			
(30) Priority Data: 09/094,765 15 June 1998 (15.06.98) US			
(71) Applicant: INVENTURE TECHNOLOGIES, INC. [US/US]; 30 Broad Street, New York, NY 10004 (US).			
(72) Inventors: ADLER, Dan; 315 E. 72nd Street #9E, New York, NY 10021 (US). SALAMA, Roberto; 180 West End Avenue #14C, New York, NY 10023 (US).			
(74) Agent: BODNER, Gerald, T.; Hoffmann & Baron, LLP, 6900 Jericho Turnpike, Syosset, NY 11791 (US).		Published <i>With international search report.</i>	

(54) Title: COMPUTER-BASED SYSTEM AND METHOD FOR DATA PROCESSING

(57) Abstract

An electronic spreadsheet (200), formed in accordance with the present invention, providing a user with improved data processing capability, including a matrix (102), the matrix including columns (100), rows (106) and cells (102), the cells being formed at intersections of the columns and the rows. The electronic spreadsheet (200) associates objects and formulas with the cells (108), each object having an object type, each formula receiving an object (202) as an argument, each formula having an operator (110), for operating on the object received as the argument. Still further, the electronic spreadsheet (200) evaluates each formula, which includes assigning to the operator in each formula an operative expression (110) selected in accordance with the object type of the object received as the argument of each formula. Still further, the electronic spreadsheet (200) associates a result, obtained during the evaluating procedure, with each cell associated with each formula operating on the object. An additional feature of the invention is that it can be programmed to recognize new data types through user programming or other means. In addition, the invention has been implemented in a client-server computing environment, and in such a way to take advantage of the Java programming environment.

